

METHOD FOR LEVYING CHARGES

- 5 This application claims priority to German application
no. 10315803.0 filed March 31, 2003, in the German
language, the contents of which are hereby incorporated
by reference.
- 10 The invention relates to a method for levying charges
for the provision of a chargeable service in a
telecommunication network.
- 15 Modern telecommunication networks are today used to
provide a multiplicity of services for users of the
telecommunication networks. Such services may be,
besides the ordering of physical goods, the ordering
and delivery of information or data (e.g. up-to-date
20 stock market information, pictures, pieces of music or
newspaper articles). There is an increasing tendency
for such services no longer (as in the early days of
the Internet, for example) to be provided at no cost,
but rather for charges to be levied for such services.
- 25 The prospect of income from charges also incites
service providers to provide particularly high value
services for the users of the telecommunication
networks. Such telecommunication networks which are
used are, by way of example, the Internet, telephone
30 land line networks or second and third generation
mobile radio networks.

The invention is based on the object of specifying a
method which allows charges to be levied for individual
35 services.

The invention achieves this object by means of a method
for levying charges for the provision of a chargeable
service in a telecommunication network, in which a

communication terminal connected with a service user sends a first service request message to a service computer which provides the chargeable service and is connected to the telecommunication network, this first
5 service request message is received and detained by an intermediate node in the telecommunication network which (intermediate node) is arranged, in relation to the flow of messages, between the communication terminal and the service computer, the intermediate node prompts a second
10 service request message, relating to the chargeable service, to be created and transmitted to a routing service computer which has an associated individual identifier, the routing service computer requests the chargeable service from the service computer, the routing
15 service computer then receives a service message from the service computer, the routing service computer transfers the service message together with the identifier for the routing service computer to the communication terminal, an exchange which is arranged, in relation to the flow of
20 messages, between the communication terminal and the routing service computer identifies from the identifier that chargeable service use is involved, and the exchange then creates a charge message relating to the service use and to the service user. In this case, the exchange
25 advantageously identifies from the identifier that chargeable service use is involved, and then creates the charge message. This advantageously makes it possible for the exchange to be able to identify chargeable service use with certainty and for a unit within the
30 telecommunication network (namely the intermediate node in cooperation with the routing service computer) to be able to use the identifier to stipulate which services are chargeable; this stipulation is made independently of the service computer or of an operator of the service
35 computer.

The inventive method can proceed such that the intermediate node prompts the second service request message, relating to the chargeable service, to be created and transmitted to the routing service computer by virtue of the intermediate node returning a readdressing message to the communication terminal, with the readdressing message containing an identifier for the routing service computer, and the communication terminal taking the readdressing message as a basis for creating the second service request message and sending it to the routing service computer. In the case of this embodiment of the inventive method, the readdressing message is advantageously used to prompt the communication terminal to create the second service request message and to send it to the routing service computer. This also advantageously takes into consideration a security aspect in telecommunication networks according to which it is desirable for changes to the destination of messages to be made by the sender of the messages.

The inventive method can be in a form such that receipt of the first service request message by the intermediate node is followed by the intermediate node using the first service request message to ascertain whether the requested service is chargeable, the first service request message being forwarded unchanged to the service computer in the case of a toll-free service, and creation and transmission of the second service request message being prompted only in the case of a chargeable service. This advantageously means that a second service request message needs to be created only in the case of chargeable services. In the case of a toll-free service, the first service request message is forwarded unchanged to the service computer; the routing service computer is not troubled in this case.

The inventive method can proceed such that the readdressing message returned is a redirect message designed as prescribed by the hypertext transfer protocol. Such a redirect message is advantageously
5 interpreted correctly according to standard by a multiplicity of communication terminals. This makes it possible to use standard mobile telephones, for example, for the inventive method which require no modification for use in the inventive method.

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The readdressing message can contain, as identifier, an IP address for the routing service computer.

The inventive method can proceed such that the
15 intermediate node uses the first service request message to ascertain whether the requested service is chargeable by comparing a feature which describes the service in the service request message with a plurality of features which are stored at the intermediate node and are
20 associated with chargeable services, and identifying the requested service as chargeable if there is a match. This is a particularly easily implemented method for ascertaining the chargeability of a service.

25 The method can also proceed such that the second service request message contains information about the service computer in the form of a URL address, this URL address is transmitted to a translation node, the translation node returns the IP address associated with the URL
30 address, and the routing service computer uses the IP address of the service computer to request the chargeable service. This configuration of the inventive method advantageously allows the routing service computer to send the second service request message to the service
35 computer even though the routing service computer does not know the IP address of the service computer on

account of the readdressing of the service request message which has taken place previously.

5 The inventive method can be in a form such that the routing service computer requests the chargeable service by using the IP address to address the service computer, and using the URL address to select the chargeable service which is to be provided by the service computer.

10 The inventive method can proceed such that creation of the charge message involves the exchange using the identifier transferred with the service message to ascertain a charge tariff associated with the identifier, the level of the charge being determined using the charge
15 tariff, and information about the level of the charge being added to the charge message. In this case, the identifier advantageously determines the respective charge tariff to be applied. Since the identifier is stipulated and selected independently of the service
20 computer, it is possible to apply various charge tariffs independently of an operator of the service computer.

The method in line with the application can proceed such that the exchange determines the period of time required
25 for transferring the service message, and the period of time and the ascertained charge tariff are used to determine the level of the charge. The method can also proceed such that the exchange determines the volume of data in the service message, and the volume of data and
30 the ascertained charge tariff are used to determine the level of the charge. This advantageously allows the level of the charge to be determined both on the basis of the time needed for transferring the service message and on the basis of the volume of data in the service message
35 using the respectively ascertained service-specific charge tariff.

The inventive method can also proceed such that transfer of the service message to the communication terminal KEG is followed by the intermediate node creating a second charge message, which contains information about a
5 blanket charge associated with the service. This advantageously means that a blanket charge can also be levied independently of the time and/or volume dependent levying of charges when a chargeable service is being used.

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The charge message and/or the second charge message can be transferred from the exchange to a payment system which handles the rest of the financial side of charge levying (for example debiting from an account or
15 invoicing).

The translation node used may be a domain statement server (DNS).

20 To explain the invention further,
figure 1 shows an exemplary embodiment of method steps in the inventive method, figure 2 shows a diagrammatic illustration of an exemplary embodiment of messages transferred in the course of the inventive method, and
25 figure 3 shows a further exemplary embodiment of method steps in the inventive method.

Figure 1 schematically shows a telecommunication network TKN, which is a mobile radio network connected to the
30 Internet in the exemplary embodiment. The invention is not limited to mobile radio networks, however, but rather the inventive method can also be used in other types of telecommunication networks, e.g. in telephone landline networks or on the Internet. A user of the mobile radio
35 network TKN has a communication terminal KEG, in the exemplary embodiment a communication terminal in the form of a mobile telephone KEG. This communication terminal

KEG is intended to be used to use a service which is provided by a service computer DR connected to the telecommunication network TKN. The service computer DR is a "server computer" providing services for users of the telecommunication network. The service computer DR may specifically be an Internet server, for example, which is part of the known Internet and is connected to the telecommunication network TKN. In the exemplary embodiment, the service computer DR is a server connected with a newspaper publisher, said server storing various newspaper articles or other collected data in the form of Internet pages ("http pages"). Selected Internet pages on the service computer DR represent a "value-content", i.e. Internet pages whose retrieval is chargeable. Other Internet pages stored on the service computer DR can be retrieved by communication terminals toll-free; such Internet pages are also called "non-value-content". The service computer DR has an associated unique identifier in the form of an Internet address IP1 = 10.2.69.254. This identifier can be used for uniquely identifying and addressing the service computer DR.

The communication terminal KEG now requests a service on the service computer DR. This service involves the service computer DR needing to transfer a chargeable Internet page to the communication terminal KEG. The communication terminal KEG sends a first service request message DAN1 to the service computer DR. This first service request message DAN1 contains, as an address statement, the identifier IP1 for the service computer DR and a "URL address" (URL - Uniform Resource Locator) which selects the chargeable service which is to be provided by the service computer DR (in this case the Internet page to be transferred by the service computer DR). Figure 1 therefore denotes the first service request message symbolically as "DAN1 (IP1, URL)". Considered in detail, the first service request message DAN1 comprises

a character string as shown in the diagrammatic illustration in figure 2: DAN1 (IP,URL) = request 10.2.69.254 www.zeitung.de/valuecontent. In this case, the URL address is formed by the character string www.zeitung.de/valuecontent. This exemplary URL address signifies that the service computer connected with the newspaper publisher (which is addressed on the Internet using the domain statement "zeitung.de") holds a stock of chargeable information pages ("valuecontent") and transfers them as a service to communication terminals on request.

In line with figure 1, the first service request message DAN1 is sent via an exchange V to an intermediate node ZK in the telecommunication network, which is arranged, in relation to the flow of messages, between the communication terminal KEG and the service computer DR; this intermediate node ZK is a "proxy computer". The intermediate node ZK receives the first service request message DAN1 and ascertains from the first service request message whether the requested service is chargeable or toll-free. In the exemplary embodiment, this is done by virtue of a feature which describes the service (in this case the URL address) in the service request message being compared with a plurality of URL addresses stored in the intermediate nodes for chargeable services. If the URL address in the first service request message matches a URL address which is stored in the intermediate node and is associated with a chargeable service, then the intermediate node ZK identifies that the requested service (i.e. the requested Internet page) is chargeable. If the relevant URL address in the first service request message DAN1 is not stored in the set of URL addresses at the intermediate node ZK, however, then the intermediate node ZK identifies that no charges are levied when the Internet page is requested, i.e. that the service is toll-free. This type of ascertainment of the

chargeability of a service has the advantage that the comparison between the URL address and the stored URL addresses at the intermediate node can be performed very quickly and inconspicuously.

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In the exemplary embodiment, it will be assumed that the intermediate node ZK has identified that the requested Internet pages are chargeable. The first service request message is then not forwarded from the intermediate node to the service computer DR (as illustrated by the dashed arrow in figure 1), but rather the intermediate node prompts a second service request message, relating to the chargeable Internet page, to be created and transmitted to a routing service computer D-DR which is connected to the intermediate node ZK. This routing service computer D-DR is a server in the telecommunication network TKN which has an associated identifier in the form of an IP address IP2 = 10.2.90.254. This IP address can be used to address the routing service computer D-DR (in a similar manner to the service computer DR). The routing service computer D-DR differs from the service computer DR in that the routing service computer D-DR cannot actually provide the Internet page delivery service itself, since no Internet pages are stored on the routing service computer D-DR. However, the routing service computer D-DR is able to retrieve the Internet pages from the "correct" service computer DR and to forward them to the communication terminal KEG. This is also illustrated by the label "routing service computer" in this application.

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To prompt the second service request message, relating to the chargeable service, to be created and transmitted to the routing service computer D-DR, the intermediate node ZK returns a readdressing message UAN to the communication terminal KEG; this readdressing message contains, besides the IP address IP2 of the routing service computer D-DR, that URL address URL which has

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been transmitted to the intermediate node ZK with the first service request message DAN1. This readdressing message is labeled as UAN (IP2, URL) in figure 1 and comprises a character string as shown in figure 2:

5 UAN(IP2,URL)=Redirect to 10.2.90.254/www.zeitung.de/
valuecontent.

The readdressing message used in this exemplary embodiment is a "redirect" message designed as prescribed by the hypertext transfer protocol. This redirect message
10 prompts the communication terminal KEG to create a second service request message DAN2, which contains, as address statement, the identifier IP2 for the routing service computer and the known URL address URL. Apart from the address statement, the second service request message
15 DAN2 can be identical to the first service request message DAN1. The communication terminal KEG sends this second service request message DAN2 to the routing service computer D-DR in the telecommunication network; the second service request message then arrives at the
20 intermediate node ZK via the exchange V. The intermediate node ZK now extracts the URL address from the second service request message DAN2 and sends this URL address URL to a translation node DNS, which in the exemplary embodiment is formed by a domain statement server in the
25 telecommunication network TKN. The domain statement server DNS returns the IP address IP1 associated with the URL to the intermediate node ZK. The intermediate node ZK then forwards the second service request message DAN2 together with the IP address IP1 (which is the identifier
30 for the service computer DR) to the routing service computer D-DR. However, the routing service computer D-DR cannot - as already explained above - provide the requested service selected by the URL, since no Internet pages are stored on the routing service computer D-DR.
35 The routing service computer D-DR provides the second service request message DAN2 with the identifier IP1 for the service computer DR and sends the second service

request message DAN2 (IP1, URL) to the service computer DR.

The service computer DR then returns the Internet page
5 selected by the URL address URL to the routing service
computer D-DR in the form of a service message DN. This
service message DN contains, as sender statement, the
identifier IP1 (in this case the IP address 10.2.69.254)
for the service computer DR. The routing service computer
10 D-DR receives the service message DN containing the
chargeable Internet page and forwards it to the
communication terminal KEG, the routing service computer
D-DR adding its identifier IP2 = 10.2.69.254 to the
service message DN as a sender statement. From the point
15 of view of the other elements in the telecommunication
network, the routing service computer D-DR is thus the
sender of the service message DN. The service message DN
(IP2) is then transferred to the exchange V via the
intermediate node ZK. The exchange V is situated, in
20 relation to the flow of messages, between the routing
service computer D-DR and the communication terminal KEG.
The exchange V forwards the service message DN (IP2) to
the communication terminal KEG and uses the identifier
IP2 transferred as sender statement with the service
25 message DN to ascertain a charge tariff associated with
this identifier IP2. Charge tariff tables are stored in a
memory in the exchange V, such a table being associated
with the identifier IP2. The exchange V also determines
the period of time needed for transferring the service
30 message DN and the volume of data (in bytes) in the
service message. The period of time, the volume of data
and the ascertained charge tariff are used by the
exchange to determine the level of the charge which needs
to be paid for the Internet page. Information about the
35 level of this charge is added to a charge message GN
freshly created by the exchange. This charge message GN
is then transferred from the exchange V to a payment

system ZS. By way of example, the charge message can contain the information that the communication terminal KEG has received Internet pages with a volume of data of 100 kbytes from the routing service computer D-DR with the IP address IP2 and that the charge to be paid for this is 2 €. In other exemplary embodiments, the level of the charge can also be ascertained on the basis of just the identifier IP2, and the identifier IP2 and the period of time, or the identifier IP2 and the volume of data.

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As a further option, the intermediate node ZK can create a second charge message GN2 and transfer it to the payment system ZS when the service message DN (IP2) is transferred to the communication terminal. The second charge message GN2 contains information about a blanket charge (for example amounting to 0.50 €) which is levied for the service associated with the service message DN (IP2). Depending on the configuration of the charge tariff which is associated with the corresponding service and is stored in the exchange V, the occurrence of a blanket charge may involve a, for example reduced, time or volume dependent charge tariff being levied or even time or volume dependent charging being dispensed with. Alternatively, it is possible for the blanket charge to be levied in addition to the time and/or volume dependent charges.

The payment system ZS then handles the rest of the financial side for the charge levied. By way of example, the charge may be debited from a prepaid account in line with the level of the charge, or a corresponding charge entry may be stored for an invoice which is to be created at a later time. Such payment systems ZS are known per se. Examples of these are the payment system "payment@vantage" from Siemens AG (as advertised, by way of example, in the printed document "Real-time-Payment - Market, Trends, Product - Edition 10.2001" on pages 74 to

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80) or the charge billing systems often provided in mobile radio networks, which work on the basis of call data records.

5 Figure 2 gives another summarized description of the method described in connection with figure 1 using a diagrammatic message flowchart. The communication appliance KEG indicated in this context is an appliance, such as a mobile telephone or computer terminal, which is
10 labeled generally "device". The exchange V used is a "service selection gateway" SSG. Such exchanges are known and are described, by way of example, in the printed document "Cisco 6400 Feature Guide", OL-0875-01, dated May 2001, particularly on pages 4-1 to 4-7. The
15 intermediate node ZK and the routing service computer D-DR connected to the intermediate node are provided by a proxy unit MSP (mobile smart proxy). The service computer DR connected with the newspaper publisher is labeled "Content Server" in figure 2. The sequences illustrated
20 in figure 2 correspond to the method steps illustrated in figure 1. Ascertainment of whether a chargeable service has been requested is labeled "Detect value content" (ascertained chargeable content). The reading of the URL address from the second service request message DAN2 by
25 the intermediate node and the ascertainment of the associated IP address by means of the DNS server is labeled "Retrieve URL & perform DNS". The transfer of the service message DN to the communication terminal KEG is shown by arrows "Deliver content". The creation and
30 transfer of the charge message GN to the payment system is labeled "Generate & Emit Price Info".

Figure 3 shows how the inventive method is simplified when a toll-free service is requested, i.e. a free
35 Internet page is requested from the service computer DR using a service request message DAN (IP1, URL*). In this

case, the URL address URL* points to a toll-free Internet page:

URL* = <http://www.zeitung.de/nonvaluepage>.

5 The intermediate node ZK forwards this first service request message DAN1 unchanged to the service computer DR. This service computer DR returns the toll-free Internet page using a service message DN (IP1), which contains the identifier IP1 for the service computer DR
10 as sender address, on a direct path to the intermediate node. The intermediate node ZK forwards the service message DN to the exchange. The exchange V identifies from the identifier IP1 that this service is not chargeable, that is to say is toll-free, and then
15 forwards the service message DN transparently to the communication terminal KEG without determining the time needed for transfer or the data capacity of the service message DN and without generating and forwarding a charge message.

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A particular advantage of the inventive method described is that charges can be levied correctly even when the service computer DR provides both chargeable and toll-free services (illustrated in the exemplary
25 embodiment by the provision of Internet pages which can be requested toll-free and Internet pages which can be requested for a charge which are stored on one and the same server). The toll-free Internet pages are transferred using a service message DN (IP1)
30 (cf. figure 3) which is transferred to the communication terminal KEG together with the identifier IP1 for the service computer. However, the chargeable Internet pages are transferred from the routing service computer D-DR to the communication terminal KEG using the service message
35 DN (IP2) (cf. the method explained in connection with figure 1). This service message DN (IP2) is transferred to the communication terminal KEG together with the

identifier IP2 for the routing service computer DR. Using the various identifiers (identifier IP1 for toll-free services, identifier IP2 for chargeable services), the exchange can correctly distinguish between service
5 messages associated with chargeable services and service messages associated with toll-free services. The use of exchanges V which use identifiers (e.g. in the form of IP addresses) transferred with the service message to ascertain whether the corresponding service is chargeable
10 and which use these identifiers to establish the associated charge tariff is advantageously possible even when a single service computer (service server) provided with a single IP address provides both chargeable and toll-free services.

15 Exchanges which can distinguish various service computers (server systems) only from their IP addresses can advantageously be used, in line with the invention, for correctly levying the charges even when a server system -
20 as illustrated above - is used to offer and provide chargeable and toll-free services, that is to say when services subject to different charging methods are provided on a common server at one and the same IP address (charging = levying charges). The inventive
25 method advantageously means that the service messages DN (IP2) relating to the chargeable services are transferred to the communication terminal KEG not by the service computer DR but rather by the routing service computer D-DR. For this reason, these service messages are
30 transferred to the communication terminal KEG together with the identifier IP2 for the routing service computer. The exchange V therefore ascertains the identifier IP2 when analyzing these service messages and is able to distinguish these service messages from other service
35 messages, associated with free services.

Advantageously - as already illustrated above - the use of the routing service computer D-DR means that transfer of the service messages DN from the service computer DR to the communication terminal KEG involves said service
5 messages being modified such that the exchange V establishes, when analyzing these service messages, that the service messages come from the routing service computer D-DR. Using the identifier IP2 for the routing service computer D-DR, the exchange V can then
10 distinguish the chargeable service messages from the toll-free messages.

The inventive method advantageously makes it possible for different chargeable services to be assigned different
15 charge tariffs. This involves providing a routing service computer having a dedicated identifier IPx (x = 2,3,4...) for each different charge tariff. If a common, standard charge tariff is applied for the chargeable services, however, then it is sufficient to use just one routing
20 service computer having a single identifier.